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A NEW MYRMECOPHILE TINEID FROM BRAZIL.

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Professor H. A. Eidmann of the Zoologisches Institut, Hann. Münden, Germany, has asked me to describe the following species, collected and reared by him from nests of *Atta sexdens* at Mendes, Brazil.

Mr. Carl Heinrich has kindly supplied the descriptions of the larva and pupa.

The plates were drawn by Mrs. Eleanor A. Carlin.

ATTICONVIVA, new genus (Fam. Tineidae).

Labial palpi (pl. 24, fig. 1) heavily scaled, laterally compressed, porrected, diverging; second joint with rough, heavy scaling above and beneath; terminal joint slightly deflected, shorter than second, fringed with heavy scaling, apex blunt. Maxillary palpi and tongue rudimentary. Antennae as long as fore wings, simple in both sexes, basal joint somewhat enlarged. Face and head rounded, smoothly scaled, face not retreating. No ocelli. Thorax smooth. Fore wings elongate ovate, costa and dorsum gently and evenly curved, apex blunt. Female (pl. 24, fig. 3) with 12 veins in fore wings, 7 and 8 longstalked to costa; 9 free; 2 from before angle of cell; 3, 4, 5, and 6 nearly equidistant; 1*b* basally forked; 1*c* present in its entire length. In the male (pl. 24, fig. 2) vein 9 is variable, sometimes out of stalk of 7 and 8, and 3 and 4 are sometimes short-stalked. Hind wings nearly as broad as fore wings, ovate, apex blunt. Female with 8 veins in hind wings, 2, 3, and 4 widely separate; 5 and 6 short-stalked; 7 parallel to 6; 8 free; a short, oblique cross vein in cell between 7 and the internal vein. In the male this cross vein is not present and veins 5 and 6 are sometimes united, making only 7 veins in the hind wings of this sex. Legs short, heavily scaled; posterior tibiae with thick scale tuft on upper side; tarsi thickened with scales.

Type: *Atticonviva eidmannella*.

The genus is typical of the family Tineidae in all stages except for the modified mandibles of the larva, described below. It is related to *Tiquadra* Walker, which it resembles in general habitus, though it has not the receding flattened face of that genus; it differs from *Tiquadra* in the stalked veins 7 and 8 of the fore wing and the stalked or united veins 5 and 6 of hind

wing, as well as in genitalia. *Atticonviva* is also comparable with and probably closer to *Setomorpha* Zeller, which has a similar though more pronounced sexual dimorphism of the venation and quite similar type of genitalia.

Atticonviva eidmannella, new species.

Labial palpi, face, and head light ochreous brown. Thorax and fore wings slightly darker, dull ochreous brown; a few scattered bluish black scales on apical part of fore wing and along costal and dorsal edge; cilia concolorous. Hind wings lighter than fore wings, light iridescent ochreous with light ochreous fuscous edges and cilia. Abdomen light ochreous fuscous. Legs ochreous brown.

Male genitalia (pl. 24, fig. 4) with the large alimentary canal supported ventrally by a weakly chitinized, elongate ventral plate and surrounded by the tegumen, which ends in an unspecialized, triangular uncus. Soci and gnathos absent; harpes lyre shaped, broad and thick at base, attenuated toward tip, which is armed with a few short, heavy spines; anellus ring shaped, strongly developed with thorns and spined extensions through which the long, slender undulating aedoeagus penetrates; the tip of the aedoeagus is pointed and there are three short spines below the tip; vinculum broad basally and with a long, strongly chitinized prolongation, which fits in between two strongly tufted soft lobes on the eighth abdominal joint, supported by two curved, chitinous rods.

Female genitalia (pl. 24, fig. 6) with slender, elongate ovipositor lobes, ostium simple, ductus bursae short, strongly chitinized and abruptly bent near ostium, rest of ductus and bursa unchitinized; bursa small, elongate, without signum.

Alar expanse: Male 16–18 mm., female 24–28 mm.

Habitat.—Mendes, Brazil (H. A. Eidmann coll.).

U. S. National Museum type No. 50459.

Paratypes in collection Eidmann.

Named in honor of the collector, Prof. H. A. Eidmann of the Zoologisches Institut, Hann. Münden, Germany, who has liberally presented the type material to the U. S. National Museum and who has supplied the biological notes on the species.

Larva (pl. 25, figs. 9–19).—Body elongate, subcylindrical, very slightly flattened, anal end bluntly rounded; sordid ochreous-whitish with areas about tubercles strongly sclerotized and pale amber yellow. Skin smooth. Prothoracic shield very broad, covering the entire dorsal area of the segment and the sclerotization extending forward into the intersegmental area; faintly divided by a fine median line; amber yellow with a narrow, irregular, brownish line on each side near posterior margin, otherwise without reticulations or color markings. A smaller, paler dorsal shield on mesothorax formed by the fused sclerotizations about paired setae groups Ia – Ib. A similar, still smaller shield on metathorax. Anal shield pale, unmarked. Prespiracular shield narrowly elongate, extended backward to include the spiracle. Spiracles dark-rimmed; thoracic and eighth abdominal spiracles oval, much larger than other abdominal spiracles; the latter

round and quite small. Legs (pl. 25, fig. 12) short, the prothoracic pair much reduced and only half the size of those on meso- and metathorax; sclerotization of coxal lobes extended and fused on prothorax to form a ventral shield; on meso- and metathorax these sclerotizations are similarly extended. Abdominal prolegs normal; crochets (pl. 25, fig. 17) uniordinal, arranged in a narrow ellipse, 40 to 44. Body setae (pl. 25, fig. 13) short to moderately long, shorter on dorsum and venter than on sides, pale; three setae (III, IV, V) on prespiracular shield of prothorax; group VI unisetose on meso- and metathorax; IV and V below the spiracle and well separated on abdominal segments 1 to 8, with III and IIIa arranged about spiracle in the form of a trapezium (almost square); III on 8th abdominal slightly nearer spiracle and slightly lower than on other abdominal segments; group VII trisetose on abdominal segments 1-7, bisetose on abdominal 8, unisetose on abdominal 9; on proleg-bearing abdominal segments one seta of the VII group upon a separate sclerotization from the other two; abdominal segment 9 with II and I upon a single enlarged sclerotization, III remote from I, IV on separate sclerotization from V and VI, all setae in a line. No secondary hair. Anal fork absent.

Head (pl. 25, figs. 9, 10) brown; slightly flattened; nearly square in outline viewed from above; with a deep, rather large concavity between juncture of adfrontal suture (ADFS) and occipital foramen and with a rather long blackish dash from incision of lateral hind margin. Frons (FR) irregularly triangular, about as broad as long, not quite reaching middle of head; frontal punctures (F^a) close together, slightly behind a line connecting frontal setae ($F1$); division between frons and epistoma not distinguishable; epistomal setae in a line on anterior margin of epistoma. Adfrontal areas broad. Epicranium with the anterior, ocellar, and lateral setae and posterior seta ($P1$) crowded well forward showing a great reduction in the anterior and a corresponding enlargement of the posterior areas of the head; setae $A1$ and $A2$ approximate, with puncture A^a somewhat closer to $A1$ than to $A2$; $A3$, approximate to $O2$ and $L1$; $A2$ on the level of $F1$; $L1$, $P1$ and $Adf1$ on a line; $P1$, $A3$, and $O2$ on a line; posterior setae ($P1$, $P2$) and puncture P^a lying forward of middle of head with puncture (P^a) approximate to seta $P2$; setae of ocellar group ($O1$, $O2$, $O3$) lying in a slightly curved line with $O1$ close to anterior margin of epicranium and both $O1$ and $O2$ showing upon dorsal surface of epicranium, ocellar puncture O^a lying between $O3$ and $O2$; subocellar setae ($SO1$, $SO2$, $SO3$) triangularly placed with $SO1$ on a projection from anterior ventral margin of epicranium (the most anteriorly placed seta on the epicranium).

Ocelli absent.

Labrum (pl. 25, fig. 11) with setae crowded forward toward anterior margin and with a single central puncture (Lp); epipharyngeal setae (ET) small, triangular, rather close together and triangularly grouped near anterior margin of epipharynx.

Mandible (pl. 25, fig. 18) with a single, greatly produced, sharply pointed, ventral tooth; cutting edge otherwise toothless, incurved and slanting sharply backward.

Antenna (pl. 25, figs. 14, 16) long, slender; joint II twice as long as I; joints III and IV fused and greatly reduced.

Submentum (SM, pl. 25, fig. 19) yellowish and covered with minute granulations except for two elongate, narrow, pale translucent areas (X) near anterior margin.

Length of full grown larva 17-20 mm.

This larva is at once distinguished from tineid larvae of other genera by the following combination of characters: Its reduced prothoracic legs, the extended sclerotization of the coxal lobes of all thoracic legs, the absence of ocelli, its lack of division between frons and epistoma, the extreme forward position of setae SO¹ and the epistomal group E¹, E², the strongly pointed, single-toothed mandible, and the pair of pale, elongate spots on the submentum.

Pupa (pl. 25, figs. 20, 21, 21a) moderately stout, abruptly tapering at caudal end. Maxillary palpi present, rather large, irregularly triangular. Prothoracic and mesothoracic legs not extending cephalad between sculptured eyepiece and antenna. Sculptured and glazed eyes, labrum, mandibles, fronto-clypeal suture, and invaginations for anterior arms of tentorium clearly indicated. Front evenly rounded, smooth. Vertex shorter than prothorax on the median line; as long on the lateral margins. Labial palpi stout, less than one fourth length of the wing. Maxillae but little longer than labial palpi. Pro-, meso-, and metathoracic coxae exposed. Prothoracic legs rather broad, not reaching middle of wing. Mesothoracic legs very broad, not extending to end of wings. Wings extending to cephalic margin of fifth abdominal segment. Metathoracic legs and antennae extending beyond tips of wings to middle of fifth abdominal segment. Dorsum of abdomen with two rows of heavy elongate spines (pl. 25, figs. 21, 21a) on segments 2 to 6 inclusive and a single row of similar spines on abdominal segments 7, 8, and 9. Tenth abdominal segment with a pair of sharp, triangular, lateral projections on each side and a similar dorsal pair. Abdominal setae minute. Genital opening an inverted Y. Anal opening slit-like, situated at end of abdomen. Cremaster absent. Abdominal segments 3 to 7 free.

Color whitish yellow to pale amber; darkest on wings, trophi, thorax, and dorsum of abdomen.

Length 10.5-11 mm., width 4 mm.

The literature on myrmecophile Tineidae is not extensive. The European *Myrmecozela ochraceella* Tengström has long been known to be associated with ants, its larvae making long silken tubes in refuse galleries of *Formica rufa*; the larvae feed on dry vegetable matter.

Meyrick (Proc. Linn. Soc. N. S. W., vol. 32, p. 72, 1907) described the genus *Cyclotorna* (type *monocentra* Meyr.) on which he quotes from F. P. Dodd: "The larva has two stages, one bug-like, the other rayed; in the latter stage it lives in the nest of ants." Mr. Dodd afterwards (Trans. Ent. Soc. London, pp. 577-589, pl. 48, 1911), gave an interesting account of the life history and excellent figures of this insect. The eggs are laid singly on the bark of trees harboring Jassidae; the young larvae are parasitic on these Jassidae and when they leave these hosts, they are taken by ants (*Iridomyrmex purpureus*) into the

ant nest for the sake of a secretion, agreeable to the ants. In the ant hill the caterpillars assume a very different flat and laterally fringed form and feed solely on the early stages of the ants. Meyrick originally described *Cyclotorna* in the family Plutellidae, but later considered it an early form of *Tineina* and erected a new family for it, Cyclotornidae. Judging from the genitalia of authentic, reared specimens, kindly given me by Mr. Meyrick, as well as from Dodd's figures of the larvae, we believe this family closely allied to the Epipyropidae, the larvae of which are parasitic on Homoptera. At least it has no close relation to *Atticonviva* or other Tineidae.

Dr. A. Reichesperger (Zool. Jahrb. Jena, vol. 35, p. 201-211, 1913) described four lepidopterous larvae and their cases found in various ants' nests in Africa, which he believed predacious on the ants and their brood. He did not succeed in rearing adults, but his so-called "Sandgehäuse-raupe" from Abyssinia proves from his excellent figures of the head capsule and mandible (figs. F and G *b*) to be a tineid and apparently closely allied to *Atticonviva*, with very similar grouping of setae and a similar one-toothed mandible, but with six ocelli (none in *Atticonviva*). The flattened cases, open in both ends, are very similar to the Indian and Javan forms, subsequently figured by Bainbrigge Fletcher and Roepke (see *post*) as well as to the specialized case described in this paper (pl. 24, fig. 8).

Bainbrigge Fletcher discovered in Ceylon tineid caterpillars living in peculiar flat cases in the nests of *Crematogaster*, and the adults bred from these larvae were described by Meyrick as *Hypophrictis inceptrix*, n. gen., n. sp. (Exot. Micr., vol. 1, p. 604, 1916). Meyrick subsequently (Exot. Micr., vol. 2, p. 85, 1917) described the larval cases found by Fletcher and described three additional species of the genus, collected in the same region, but without biological notes. Fletcher gave a very good plate of *Hypophrictis inceptrix* and another unnamed species of the genus (Mem. Dept. Agr. India, Entom. Ser., vol. 6, pl. 55, 1920), showing the larvae and the characteristic flat cases.

The most important contribution on the subject is Dr. W. Roepke's paper (Tidschrift voor Entomologie, vol. 68, 1925) in which he described a new allied genus and species, *Hypophrictoides dolichoderella*, associated with and predacious on ants in Java, and gives good figures of all stages and most interesting notes on the manner in which the larvae secure and prey on the ant pupae. Dr. Roepke was able under glass to observe how the caterpillars were afraid of the adult ants and quickly withdrew to safety in their flat eight-shaped cases when unloaded ants came near; but when an ant came within reach, carrying in its jaws an ant pupa, the caterpillar would strike out and grasp the pupa from the surprised ant and quickly withdraw into its case to devour the pupa at leisure. Dr.

Roepke found that one larva sometimes stored up several ant pupae inside its case and then did not appear outside for a long time, while it devoured its stored-up supply.

Both of these genera, *Hypophrictis* Meyrick and *Hypophrictoides* Roepke, are closely related to the present genus, *Atticonviva*, but differ structurally in venation, having veins 2 and 3 in fore wing stalked and 7 to termen, and having veins 5 and 6 of hind wing closely approximate, not stalked or coincident as in *Atticonviva*. A reared female and its case of *Hypophrictis*, kindly sent me by Mr. Fletcher, shows great similarity in genitalia to those of *Atticonviva* and has, like this genus, narrow ovipositor lobes and a weak elongate bursa without signum.

Silvestri has described (Cont. d. Termitidi e. Termitofili, part 2, p. 297-302, Portici, 1920) from the caterpillars a new genus and species of a highly modified termitophile lepidopteron from Africa, which he tentatively placed in the family Tineidae; similar larvae found in termite nests in Africa were described and figured by I. Trägaarh (Ark. f. Zoologi, vol. 3, no. 22, p. 1-7, pl. 1, 1907). From Silvestri's figures 19-20 it appears very improbable that his species is a tineid, at least it has no relationship to the other genera here discussed.

According to Hagen (Linn. Entom., vol. 10, p. 320, 1855) Burmeister found a tineid in a termite nest in Brazil.

The larvae of the present species were found commonly by Dr. Eidmann in the abandoned mushroom beds of *Atta sexdens* where they construct flattened cases and galleries. The cases are light brown in color and are composed of small grains of sand, particles of compost, and excrement, roughly spun together with silk; there are also occasionally unmistakable fragments of insect chitin, apparently parts of ants, but these are so few and scattered that they are hardly significant and certainly not conclusive support of the suspected animal food. They are more probably skeletal remains of dead ants accidentally encountered in the compost and accidentally woven into the larval cases. The cases are open in both ends in a large horizontal slit and the inside is sparsely lined with silk; they are from 5 to 7 mm. wide and vary in length from 15 to 25 mm. The females find their way into the ant nest and lay their eggs in the discarded mushroom beds. Dr. Eidmann took only females in these nests and suggests that pairing takes place in the open and that the males die while the females seek entrance into the ant nests; he fortunately reared both sexes from the larvae collected.

From the form of the larval mandibles, which do not appear suited to chew vegetable matter, I had surmised that the larvae were predacious on the early stages of the ants, but Dr. Eidmann informs me that the larvae and their cases were found in the abandoned chambers of the ants in which the discarded old leaf

fragments were accumulated, and in which no ants of any stage were found. He has, moreover, examined the food content of the larval digestive tract and found only vegetable material.

It would be easy for these larvae to feed without much chewing on the fine particles of compost in which they live, but the specialized piercing mandibles suggest an animal food of which possibly only the juices are swallowed, and such juices might not be apparent in the alcoholic larval stomachs studied by Dr. Eidmann. That their food does not consist of ant larvae or pupae is apparent, however, because such are not found in the discarded compost, but these large accumulations of decomposed leaves teem with other insect larvae of many kinds, which could easily fall prey to the tunnelling lepidopterous caterpillars.

Dr. Eidmann collected in the same locality in Brazil very similar caterpillars in the nests of the other large leaf-cutting ant, *Acromyrmex*; these caterpillars make larger and more specialized flat cases (pl. 1, fig. 8) more smoothly spun than those of *eidmannella*, shaped like an hourglass, constricted in the middle, and the upper and lower walls are connected only in the middle of the case, leaving them free, but elastically closed together on the major part of the edge, thus permitting very free motion of the larva at both ends of the case. These caterpillars are nearly identical in structure and are undoubtedly congeneric with *eidmannella*; they differ only in having posterior seta P^1 much farther forward upon the epicranium, almost on the level of frontal punctures (F^a); fused joints III and IV of antenna longer (comp. pl. 25, figs. 14, 15), as long as the long seta of joint II, this seta also much shorter than in *eidmannella*.

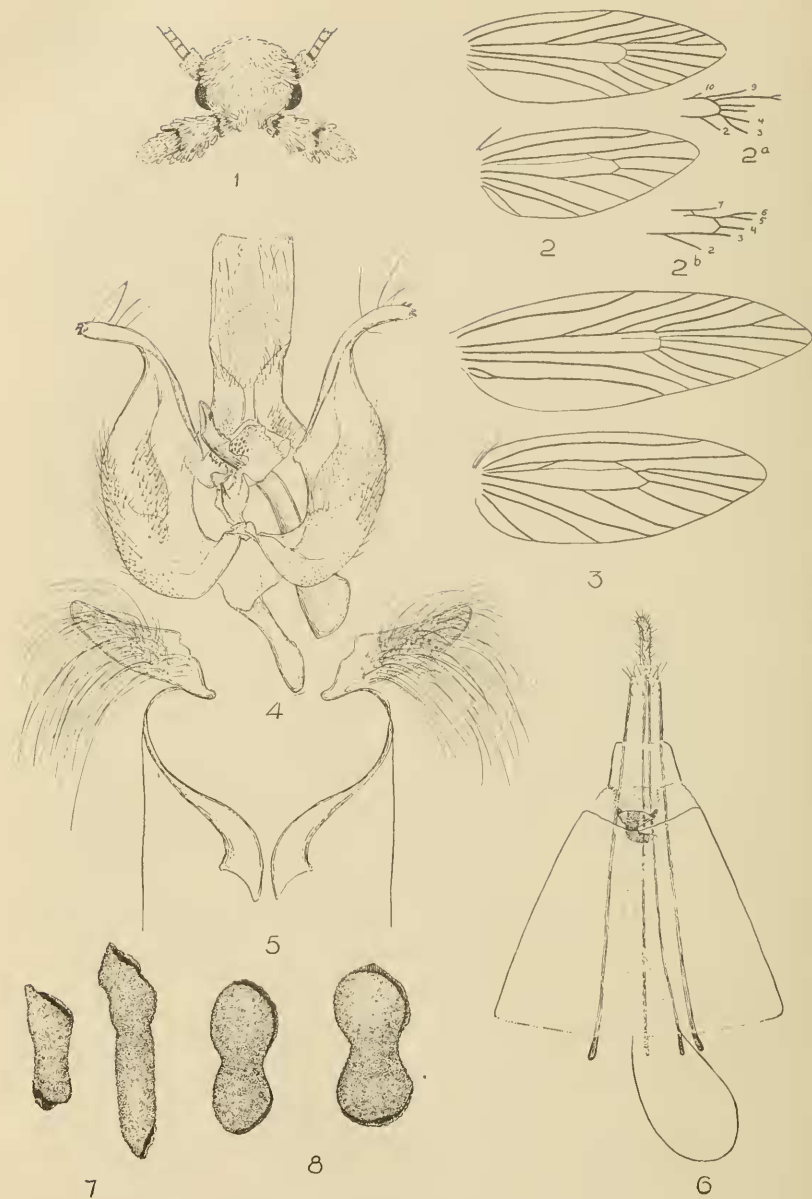
They were found in the living mushroom beds of the ants and while there has been no actual observation of their food habits, they were at least in position to obtain larvae and pupae and they may represent a further step toward true myrmecophagous forms.

EXPLANATION OF PLATES.

Atticonviva eidmannella Busck.

Plate 24.

- Fig. 1. Head and labial palpi.
- Fig. 2. Wing venation of male.
- Fig. 2 *a* and *b*. Variations of venation of male.
- Fig. 3. Wing venation of female.
- Fig. 4. Male genitalia.
- Fig. 5. Supporting structure of eighth segment.
- Fig. 6. Female genitalia.
- Fig. 7. Larval cases.
- Fig. 8. Larval cases of allied *Atticonviva* species.



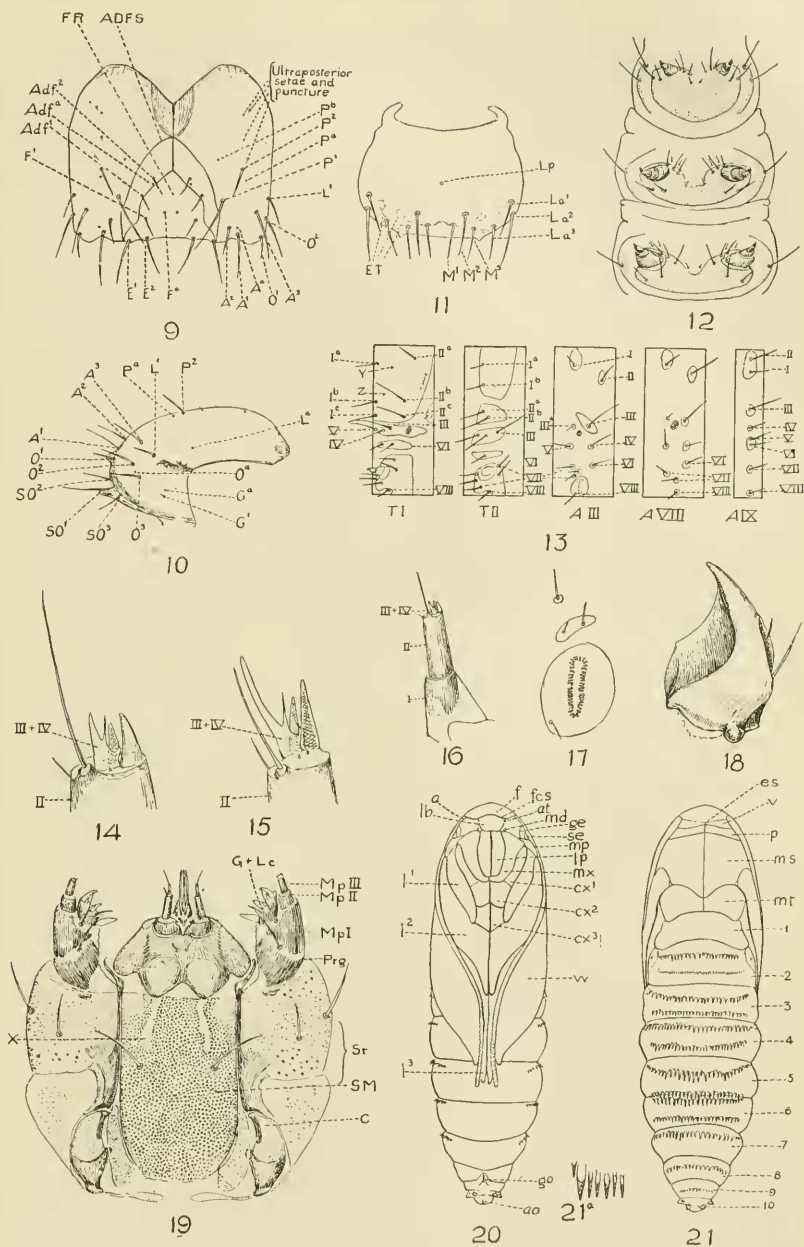


Plate 25.

Fig. 9. Dorsal view of head capsule of larva showing setal arrangement.

Fig. 10. Lateral view of head capsule.

Fig. 11. Labrum of larva.

Fig. 12. Thoracic segments of larva, ventral view; leg setae, except for those on coxa, omitted.

Fig. 13. Setal map of first and second thoracic and third, eighth, and ninth abdominal segments of larva.

Fig. 14. Terminal joints of larval antenna, greatly enlarged.

Fig. 15. Terminal joints of larval antenna of allied *Atticonviva* sp., same enlargement as fig. 14.

Fig. 16. Antenna of larva.

Fig. 17. Proleg of larva showing arrangement of crochets.

Fig. 18. Mandible of larva.

Fig. 19. Labium and maxillae of larva.

Fig. 20. Pupa, ventral view.

Fig. 21. Pupa, dorsal view.

Fig. 21 a. Sample of dorsal spines, greatly enlarged, on abdomen of pupa.

AN APPARENTLY NEW SPECIES OF NORTH AMERICAN HYLOBIUS, WITH SYNOPTIC KEY (COLEOPTERA : CURCULIONIDAE).

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Recent field work in New York and Minnesota has brought to light a species of *Hylobius* that attacks the root crown of living Scotch pine (*Pinus sylvestris*). This weevil is closely related to *Hylobius pales* Herbst, but differs in certain adult structures as well as in some details of its life history. The writer is indebted to Dr. F. C. Craighead for first pointing out the probable significance of the different habits of the root-crown species, and also for aid in obtaining a good set of specimens for study.

Hylobius radicis, new species.

Length 9.6 to 12.5 mm. Similar to *pales* in shape but with elytra a little less flattened on disk and slightly longer compared with prothorax. Rostrum feebly arcuate, as long as or a little longer than prothorax; punctuation dense but rather more regular than in *pales*, and generally not leaving a smooth median line or carina, as is commonly the case in *pales*; vestiture finer than in *pales*, and upper edge of scrobe not so prominent; head densely, finely punctate, the punctures behind interocular fovea, though often larger than adjacent punctures, not or only slightly coalescent; vestiture fine, not condensed in a spot or line of coarser scales on forehead. Pronotum with strigose sculpture not quite so strongly developed as in *pales*. Elytra with irregularly placed spots of